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Indian Standard

SPECIFICATION FOR
IGNITION SWITCHES FOR AUTOMOBILES

UDC 621·316·542 : 621·43·04 : 629·113·066

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

July 1980

AMENDMENT NO. 2 JANUARY 1993
TO
IS 9432 : 1980 SPECIFICATION FOR IGNITION SWITCHES FOR AUTOMOBILES

(*Page* 3, *clause* 1.1, *line* 3) — Substitute the following for the existing line:

'...... for use only on 6, 12 and 24 V dc automotive electrical systems.'

(TED 11)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 1 OCTOBER 1984
TO
IS:9432-1980 SPECIFICATION FOR IGNITION SWITCHES FOR AUTOMOBILES

Corrigendum

(*Page 8, clause 7.7, last line*) - Substitute the following for the existing matter:

'Dwell time (time in each position) - 1.0 to 2.0 seconds.'

(ETDC 14)

Reprography Unit, ISI, New Delhi, India

Indian Standard

SPECIFICATION FOR IGNITION SWITCHES FOR AUTOMOBILES

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(*Continued on page* 2)

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(*Continued from page* 1)

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SPECIFICATION FOR IGNITION SWITCHES FOR AUTOMOBILES

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 11 February 1980, after the draft finalized by the Automobile Electrical Equipment Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 Only those dimensions have been specified which would facilitate the interchangeability of the switches.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard specifies the constructional and performance requirements and methods of tests for rotary action ignition switches intended for use on 6, 12 and 24 V automotive electrical systems.

1.2 The ignition switch may be with or without lock. The requirements for lock are not covered in this specification.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Ignition Switch — A device used by the operator of an automotive vehicle for connecting or cutting off electric supply to the ignition system of the vehicle. The switch may control additional circuits like windshield wipers, head lights, starters, etc.

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*Rules for rounding off numerical values (*revised*).

2.2 Ratings — The voltage and current range at which the switch is designed to operate satisfactorily.

2.3 Rated Voltage — The operating voltage specified by the manufacturer for each terminal or pair of terminals at which the switch is designed to operate satisfactorily.

2.4 Rated Current — The maximum current specified by the manufacturer for terminal or pair of terminals at which the switch is designed to operate satisfactorily.

2.5 Type Tests — Tests carried out to prove conformity with the requirements of this standard. These are intended to prove the general quality and design of a given type of ignition switch.

2.6 Acceptance Tests — Tests carried out on samples taken from a lot for the purpose of acceptance of the lot.

2.6.1 *Lot* — All ignition switches of the same type, design and rating, manufactured by the same factory during the same period, using the same process and materials, offered for inspection at a time shall constitute a lot.

2.7 Routine Tests — Tests carried out on each ignition switch to check the requirements which are likely to vary during production.

3. RATINGS

3.1 Rated Voltage — The rated voltage shall be one of the following:

6, 12 or 24 V dc.

3.2 Rated Current — As specified by the manufacturer.

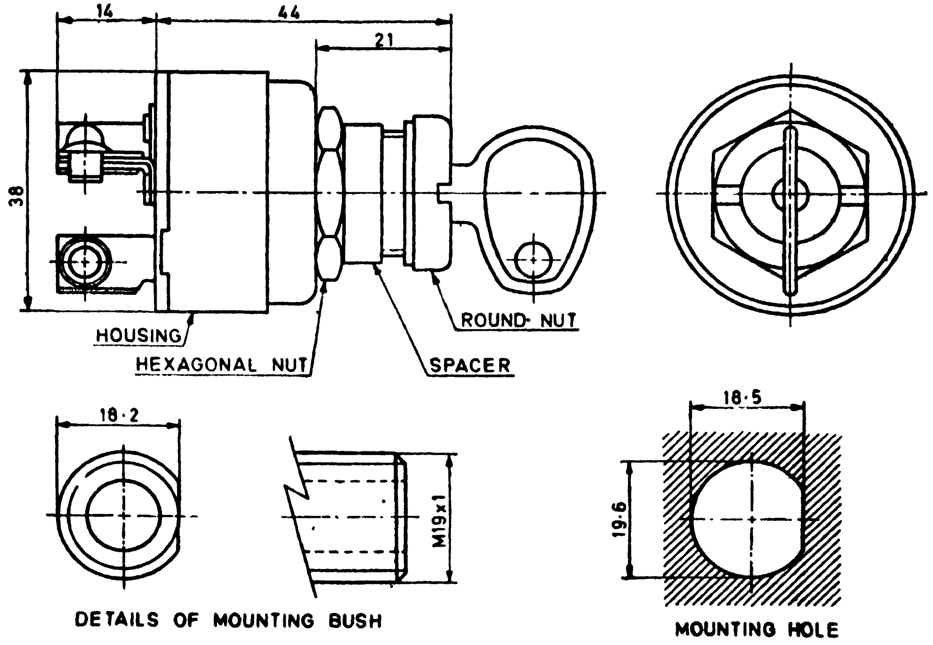
4. DIMENSIONS

4.1 The envelope and mounting dimensions of the switch shall be as shown in Fig. 1.

5. MATERIALS AND CONSTRUCTION

5.1 Materials — All materials used in the construction of the switch shall be suitable for tropical use.

5.2 Construction — The switches shall be so designed and constructed as to be mechanically robust and free from any operational difficulties. They shall function safely and reliably under the conditions of vibrations, shocks, etc, met with during normal installation and use. They shall have adequate resistance to corrossion, heat and humidity.



NOTE — The dimensions of the panel cut-out are given for the information of the user.

All dimensions in millimetres.

FIG. 1 IGNITION SWITCH SHOWING RECOMMENDED ENVELOPE AND MOUNTING DIMENSIONS

6. MARKING

6.1 The switch shall have the following information marked indelibly at a conspicuous place:

a) Name and/or trade-mark of the manufacturer;

b) Terminal numbers;

c) Ratings;

d) Part number;

e) Month and year of manufacture; and

f) Country of manufacture.

6.2 The switches may also be marked with the ISI Certification Mark.

> NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

7. TESTS

7.1 Classification of Tests

7.1.1 *Type Tests* — The following shall constitute type tests:

a) Visual examination (*see* **7.2**);
b) Measurement of dimensions (*see* **7.3**);
c) Performance tests (*see* **7.4**);
d) mV drop test (*see* **7.5**);
e) Insulation resistance test (*see* **7.6**);
f) Endurance test (*see* **7.7**);
g) Vibration test (*see* **7.8**);
h) Dry heat test (*see* **7.9**);
j) Damp heat (cycling) test (*see* **7.10**);
k) Low temperature test (*see* **7.11**);
m) Dust test (*see* **7.12**) ; and
n) Twist test (for key only) (*see* **7.13**).

7.1.1.1 *Criteria for approval* — Nine samples shall be submitted for testing together with the relevant data. The testing authority shall issue a type approval certificate if the ignition switch is found to comply with the requirements of the tests given in **7.1.1**.

7.1.1.2 All samples shall be tested for:

a) Visual examination (*see* **7.2**),
b) Measurement of dimensions (*see* **7.3**),
c) Performance tests (*see* **7.4**),
d) mV drop test (*see* **7.5**), and
e) Insulation resistance test (*see* **7.6**).

The samples shall then be subjected to the tests in the following manner:

f) Endurance test (*see* **7.7**)	3 samples
g) Vibration test (*see* **7.8**)	2 samples
h) Dry heat test (*see* **7.9**)	1 sample
j) Damp heat (cycling) test (*see* **7.10**)	1 sample
k) Low temperature test (*see* **7.11**)	1 sample
m) Dust test (*see* **7.12**)	1 sample

7.1.1.3 In case of failure in one or more type tests, the testing authority may call for fresh samples not exceeding twice the number of original samples and subject them to test(s) in which failure occurred. If, in repeated test(s) no failure occurs, the test may be considered to have been satisfactory.

7.1.2 *Acceptance Tests* — The following shall constitute acceptance tests:

a) Visual examination (*see* **7.2**),
b) Measurement of dimensions (*see* **7.3**),
c) Performance tests (*see* **7.4**), and
d) mV drop test (*see* **7.5**).

7.1.2.1 *Sampling plan and criteria for acceptance* — A recommended sampling plan and criteria for acceptance of a lot is given in Appendix A.

7.1.3 *Routine Tests* — The following shall constitute routine tests:

a) Visual examination (*see* **7.2**), and
b) Performance tests (*see* **7.4**).

7.2 Visual Examination— The switches shall have a smooth finish and shall be properly assembled.

7.3 Measurement of Dimensions—The ignition switch shall conform to the dimensions shown in Fig. 1.

7.4 Performance Tests

7.4.1 *Mechanical Test* — The switch shall operate smoothly and locate positively in all positions except ' start ' from which it shall spring return on release with no signs of sticking. The switch torque for various positions shall be 1·5 N-m, *Max*.

7.4.2 *Electrical Test* — The switch shall be connected in a suitable circuit adjusted to pass rated current through the switch. The switch shall be operated ten times.

7.4.2.1 *Requirement* — The circuit operation shall be positive and free from any abnormalities, for example, flicker of lamp load.

7.5 Millivolt Drop Test

7.5.1 *Main Contacts* — The switch shall be connected in a suitable circuit adjusted to pass 10A through each terminal. The voltage at the terminals shall be maintained at 7, 14 and 28 V for switches rated at 6, 12 and 24 V respectively. Three consecutive voltage drop readings (due to contact resistance) between the terminals shall be noted.

7.5.1.1 *Requirement* — The average value of millivolt drop shall not exceed the following:

a) Before endurance test	100 mV
b) After endurance test	150 mV

7.5.2 *Auxiliary Contacts* — For auxiliary contacts such as for warning lamp circuit, a current of 1A shall be passed.

7.5.2.1 *Requirement* — The average of three consecutive readings shall not exceed the following:

a) Before endurance test	100 mV
b) After endurance test	500 mV

7.6 Insulation Resistance Test — The insulation resistance shall be measured between any pair of non-short-circuited terminals with a voltage of 500 V dc.

7.6.1 *Requirement* — The insulation resistance shall be not less than 1 MΩ.

7.7 Endurance Test—The switch shall be suitably mounted at an ambient temperature of 27 ± 2°C. The switch shall be connected in a suitable circuit adjusted to pass rated current through each terminal. The test voltage at terminals shall be 7, 14 and 28 V for switches rated for 6, 12 and 24 V respectively. The switch shall be operated for 100 000 cycles. Each cycle shall consist of sequencing through each position with dwell time as follows and return to initial position without dwell in the intermediate positions:

Travel time (time from one position to next) — 0·1 to 0·5 seconds.

Dwell time (time in each position) — 0·1 to 2·0 seconds.

At the end of the test, the switch shall be brought down to room temperature.

NOTE — The travel and dwell time periods are for guidance only. The actual values which depend upon the application and shall be subject to agreement between the manufacturer and the user.

7.7.1 *Requirement* — At the end of the endurance test, the switch shall meet the requirements of visual examination (**7.2**) and mV drop test (**7.5**).

7.8 Vibration Test — The switch shall be rigidly mounted on a suitable vibrating machine capable of producing single harmonic motion and subjected to the following conditions of vibration:

Total lift	1·5 mm
Frequency cycle	10-55-10 Hz per minute.

The frequency shall be varied continuously and the vibration shall continue for not less than one hour for each of the three axes of the switch.

7.8.1 *Requirements* — The switch after vibration test shall meet the requirements of visual examination (**7.2**) and mV drop test (**7.5**).

7.9 Dry Heat Test — The test shall be carried out in accordance with IS : 9000 (Part III/Sec 5)-1977[*]. The test chamber temperature shall be 55 ± 2°C. The recovery period shall be 2 hours.

7.9.1 *Requirement* — The switch after the dry heat test shall meet the requirements of performance tests (**7.4**).

7.10 Damp Heat (Cycling) Test — This test shall be carried out in accordance with IS : 2106 (Part II)-1962[†]. The number of conditioning cycles shall be 7.

7.10.1 *Requirement* — The switch after the test shall meet the requirements of performance tests (**7.4**).

7.11 Low Temperature Test — The test shall be carried out in accordance with IS : 9000 (Part II/Sec 4)-1977[‡]. The temperature severity for this shall be (—) 25 ± 3°C and the recovery period shall be 2 hours.

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[*] Basic environmental testing procedures for electronic and electrical items: Part III Dry heat test, Section 5 Dry heat test for dissipating tems gradual change of temperature.

[†] Environmental tests for electronic and electrical equipment: Part II Damp heat (cycling) test.

[‡] Basic environmental testing procedures for electronic and electrical items: Part II Cold test, Section 4 Cold test for heat dissipating items with change of temperature.

7.11.1 *Requirement* — The switch after the low temperature test shall meet the requirements of performance tests (**7.4**) and mV drop test (**7.5**).

7.12 Dust Test — The test shall be carried out in accordance with IS : 2106 (Part XII)-1965*.

7.12.1 *Requirement* — After the test, the switch shall meet the requirements of performance tests (**7.4**).

7.13 Twist Test (for Key Only) — The key shall be gripped by the head and turned with the fixed stem with a turning effort of 2·5 N.m.

7.13.1 *Requirement* — The key shall show no visual twist or any other deformation.

APPENDIX A

(*Clause* 7.1.2.1)

SAMPLING PLAN OF IGNITION SWITCHES

A-1. SCALE OF SAMPLING

A-1.1 Lot — In any consignment, all ignition switches of the same rating manufactured from the same raw material under similar conditions of production shall be grouped together to constitute a lot.

A-1.2 The number of ignition switches to be selected from each lot shall depend upon the lot size and shall be in accordance with col 1 and 2 of Table 1.

TABLE 1 SIZE OF SAMPLE AND PERMISSIBLE NUMBER OF DEFECTIVES

(*Clauses* A-1.2 *and* A-2.1)

Lot Size (1)	Sample Size (2)	Permissible Number of Defectives (3)
Up to 100	8	0
101 to 300	13	1
301 to 500	20	1
501 to 1 000	32	2
1 001 and above	50	3

---

*Environmental tests for electronic and electrical equipment: Part XII Dust test.

A-1.2.1 These switches shall be selected from the lot at random. In order to ensure the randomness of selection, procedure given in IS : 4905-1968* may be followed.

A-2. NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

A-2.1 The ignition switches selected at random according to col 1 and 2 of Table 1 shall be examined for visual requirements and subjected to performance and mV drop test. The ignition switches failing to satisfy any of these requirements shall be considered as defective. The lot shall be considered conforming to the requirements of this specification if the number of defective ignition switches found in the sample is less than or equal to corresponding permissible number given in col 3 of Table 1, otherwise the lot shall be rejected.

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*Methods for random sampling.

INDIAN STANDARDS

ON

AUTOMOBILE ELECTRICAL EQUIPMENT

IS :

1062-1963	Methods of test for sparking plugs (*revised*)
1063-1963	14-mm sparking plugs (*revised*)
1884-1970	Automobiles electric horns (*first revision*)
2077-1962	Automobile electric horn relays
2081 (Part I)-1976	Taper terminal cable connectors for automobile batteries: Part I Brass type connectors (*first revision*)
2325-1963	Ignition coils
2577-1974	Cartridge fuse-links for automobiles (*first revision*)
2646-1964	Generators (dynamos) for automobile
3105-1966	General requirements for automobile lighting and signalling devices
3141-1965	Starters for automobiles
3563-1974	Automobile headlights (replaceable lamp type) (*first revision*)
3628-1966	Side lights, tail-lights, parking lights, stop lights and direction indicators for automobile use
4050-1976	Methods of tests for horn switches for automobiles (*first revision*)
4060-1978	Flashers for direction indicators for automobiles (*first revision*)
4061-1967	Headlight switches for automobiles
4062-1967	Foot-operated headlight dip switches for automobiles
4063-1967	Fuse box for automobiles
4086-1967	Methods of test for distributors
4362-1967	Recommendation for lighting of number plates for automobiles
4370-1967	Code of practice for the use of lighting and signalling devices on cars and commercial vehicles
4373-1967	Hydraulically operated stop light switches for automobiles
4815-1968	Self-cancelling direction indicator switches for automobiles
5439-1978	Oil pressure switches for automobiles (*first revision*)
5545-1977	Fog lights for automobiles (*first revision*)
5546-1970	Distributor caps for automobiles
5562-1970	Fuel gauges for automobiles
5577-1970	Ammeters for automobiles
5977-1971	Regulators for automobile dc generators (dynamos)
7471-1974	Recommendation for polarity of earth connections and marking of electrical equipment for automobiles
7528-1974	Porcelain (moulded) fuse-links for automobiles
7827 (Part I)-1975	Electrical wind screen wipers: Part I Wiper system
7827 (Part II)-1975	Electrical wind screen wipers: Part II Wiper motors
7953-1976	Horn rings for automobiles
7998-1976	Contact breakers for two wheelers, three wheelers and stationary spark ignition engines
8395 (Part I)-1977	Cable terminations for automobile wiring: Part I Blade type connectors (male and female)
8395 (Part II)-1977	Cable terminations for automobile wiring: Part II Bullet and tube type connectors
8415-1977	Mounting dimensions of headlights for automobiles
8416-1977	Mounting dimensions of fog lights for automobiles
8925-1978	Alternators for automobiles
9432-1980	Ignition switches for automobiles
9433-1980	Piano key type switches for use in automobiles

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

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